STATUS OF THE REDHEADED PINE SAWFLY ON THE OCALA NATIONAL FOREST, 1982

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ABSTRACT

The redheaded pine sawfly is currently causing heavy defoliation on several young plantations of longleaf pine. This report discusses the biology, economic aspects, and recommendations for control of the insect.

INTRODUCTION

The redheaded pine sawfly (Neodiprion leconteii [Fitch]) is one of the most important native forest insects defoliating young, hard pines in the eastern half of the United States. High sawfly populations have resulted in the death or deformity of young pine growing in pure pine plantations.

The heaviest infestations often occur on pines growing under stress, particularly those on poor soils and where there is heavy, competitive vegetation.

In early October, entomologists from Forest Pest Management and Southeastern Forest Experiment Station conducted an aerial survey and inspected several young longleaf pine plantations on the Seminole Ranger District of the Ocala National Forest. The following evaluation is designed to provide the land manager with biological information and recommendations for dealing with the current outbreak.

Insect

Redheaded pine sawfly, Neodiprion leconteii (Fitch).

Hosts

The redheaded pine sawfly prefers hard pines. On the Ocala National Forest, this includes loblolly, longleaf, slash, and sand pines. The sawfly primarily attacks trees less than 15 feet tall. It can be a major problem in young pine plantations.

Type of Damage

The first instar larvae escape from the egg and remain in a group, feeding on the needles from which they hatch or on adjacent needles. They chew small ragged notches in the edges, generally taking but a few pieces from any one. The second instar larvae do noticeable damage when they strip the edges of the needles, leaving only the central vascular tissue, which soon dries and appears as reddish, straw-like masses. These straw-like flags are visible from a considerable distance and are, therefore, useful during prespray population surveys.

After molting a second time, the larvae generally ascend the tree to feed on the needles of the leader and branch tips. These later instar larvae feed voraciously in well exposed positions on the tree, often in groups of 3 to 5 per needle.

Injury to hard pines, resulting from sawfly defoliation, is often severe during epidemics, especially when young pine plantations are attacked. Moderate to heavy defoliation stunts height growth of infested trees, and forking may result in the upper crown.

Life History

The sawfly overwinters as a prepupa in a cocoon spun in the litter or topsoil beneath its host. Pupation occurs soon after the advent of warm weather, and emergence of the adult follows in a few weeks. Some prepupae may remain in a resting state, called dispause, over several seasons before emerging.

The female deposits about 120 eggs in the current or previous year's needles. They are laid individually in a row of slits or in a pocket cut in the edge of the needle. All the eggs laid by one female are generally clustered on needles of a single twig. The eggs hatch in 3 to 5 weeks, depending on temperature and locality. The larvae feed gregariously, remaining on the host for 25 to 30 days. When fully grown, they drop to the ground and spin their cocoons. In Florida, there are at least three complete generations per year.

METHODS

Standard, sketch mapping procedures were used in the aerial survey. Two observers each viewed a strip .5 mile wide. The flight lines were spaced 1 mile apart, resulting in a 100 percent survey over the desired area. Areas of heavy and moderate defoliation were plotted on Class "A" Forest Service maps of the District.

A ground check of four areas experiencing high defoliation was inspected for causal agent and severity of the problem. Samples of larvae were collected and checked for signs of parasitism.

RESULTS AND DISCUSSION

Due to the small size of the attacked trees and oak understory, delineation of defoliation from the air was difficult. Areas of high defoliation revealed the oak understory, making it difficult to determine defoliation versus oak type.

The defoliation that was evident, as in the case of areas inside or on the edge of well defined plantations, was ground checked. Total acreage affected is estimated to be less than 1,000 acres.

For the most part parasites which exert any control on sawfly populations attack the late larvae. Some parasites lay their eggs behind the sawfly's head, while others are inserted into the sawfly's body. Inspection of collected sawflies revealed no eggs present on the larvae body. These will be reared in order to determine if internal eggs are present During examination of the defoliated areas, parasite activity was not noted.

The sawfly problem is severe and may result in unacceptable levels of mortality, dieback, and deformity in the young stand. Most trees attacked were approximately 12 to 15 feet tall. If terminal dieback should occur, the first log would be damaged.

The stress the trees are currently experiencing also makes them susceptible to secondary pests. A weevil, Pissodes approximatus, has caused mortality in young pines weakened by defoliation, as well as species of Ips.

RECOMMENDATIONS

Currently, there are two choices available to the forest manager:

1. Do nothing. Allow the sawfly outbreak to be controlled by natural means. The affected stands are even aged and will provide the sawfly with an abundance of favorable host type. This, coupled with the apparent low parasite pressure on the sawfly, will mean a rapid increase in the current sawfly population and a resulting increase in acreage defoliated. If secondary pests do attack, these could build high populations and threaten nearby mature stands.

2. Use of chemical control (see Appendix 1). Currently, two chemicals are registered for sawfly control: Malathion and Carbaryl (Sevin). Of these, Sevin is highly toxic to honeybees With the large number of orchards in the area dependent on insect pollination, and since bees will be active during the time of spraying, Malathion would be the preferred choice.

In addition to the above-mentioned options, there is one other worth noting. A virus has been developed in Canada for control of the redheaded pine sawfly. However, it is not yet registered for general use in the United States. It can be used in field testing for registration.

To reduce the risk of redheaded pine sawfly attack in the future, the following silvicultural recommendations are presented:

1. Avoid planting hard pines within approximately 25 feet of all hardwood borders, or remove or girdle residual hardwoods.

2. Undertake early release of hard pine plantations from hardwood overstory.

3. Replant areas of poor survival to prevent widely spaced, open plantations.

4. Promote early closing of plantations by altering planting spacing for the particular site.

APPENDIX 1

Assessment of Value to Control the Redheaded Pine Sawfly on the Ocala National Forest

The most straightforward approach to determine the value of spraying for redheaded pine sawfly on 1,000 acres in the Ocala National Forest is to take the net present value of a scenario that supposes control will be used to impede the sawfly and contrast it with one that supposes no control will be attempted. In the former scenario, with control, the protected trees will survive with negligible growth loss; however, in the latter scenario, without control, the infested 10 year old trees will be lost; there will be no salvage value, and the stand will have to be regenerated. The net present value of each scenario is determined by calculating the value of the discounted costs and revenues (at 4% and 10% discount rates) and subtracting the no-control from the control method (Charts 1 and 2).

Cost for each silvicultural activity per acre was estimated along with revenues associated with typical per acre yields that would come from the Ocala National Forest during thinnings and clearcut. Thinnings occur at years 25, 35, and 45, while the stand is clearcut at age 55. Prices are estimated at $25 per cord, $125 per MBF for sawtimber thinnings, and $150 per MBF for sawtimber clearcut. These stumpage values are increased 2 percent per year to reflect real stumpage price increases with the passage of time. No consideration for inflation has been made in this analysis for either costs or revenues.

If the 10 year old stand is sprayed and protected with Malathion, it will take 45 additional years until the stand is clearcut; however, if no protection is provided, the established stand will have to be cleared and the site regenerated; a circumstance that will require 55 years until the stand is ready for clearcut. Present net values at 4 percent are $947 and $678 for the protection and no-protection scenarios, respectively. Present net values at a 10 percent discount rate are $125 and $-46 for the protection and no-protection alternatives, respectively. Subtracting the two alternatives at each discount rate yields $269 for the 4 percent discount rate and $171 at the 10 percent discount rate. These last two values are the values per acre to a land manager for investing in control of the sawfly. Thus, if the forestry investment is valued at 4 percent, it would pay the land manager to invest up to $269 per acre in control measures. Similarly, if the investment is valued at 10 percent, the cost per acre for control could go as high as $171 per acre to ensure protection of the established stand. Benefit/cost ratios are approximately 27:1 and 17:1 at the 4 percent and 10 percent discount rates, respectively.

Chart 1 -- ORIGINAL STAND SPRAY TREATED WITH MALATHION

Year		Yield Cords	Yield MBF	Costs/Acre	Revenues/ Acre	Present Value/ Acre 4%	Present Value/ Acre 10%
0	Stand is age 10; sprayed from helicopter with malathion to prevent Redheaded pine sawfly from killing timber.						
	Cost of malathion.			-2.50		-2.50	-2.50
	Cost of helicopter.			-7.00		-7.00	-7.00
14	Pulpwood marking & sales admin.			-2.50		-1	-1
15	Pulpwood thin (year 25 of management plan)	5.0			168	93	40
24	Pulpwood marking & sales admin.			-2.50		-1	0
25	Pulpwood thin (year 35 of management plan)	7.0			287	108	26
34	Sawtimber marking & sales admin.			-5.00		-1	-0
35	Sawtimber & pulpwood thin (year 45 of management plan)	3.0	1.5		525	133	19
44	Clearcut marking & sales admin.			-7.50		-1	0
45	Clearcut (year 55 of management plan)		10		3657	626	50
	Net Present Value					$ 947	$ 125
	Value of spray (Malathion NPV minus Clearcut & Regeneration NPV)					$ 269	$ 171

Chart 2 -- ORIGINAL INFECTED STAND CLEARCUT AND STAND REGENERATED

Year		Yield Cords	Yield MBF	Costs/Acre @6% inflation	Revenues/ Acre	Present Value/ Acre 4%	Present Value/ Acre 10%
0	Clear cut infected stand. No salvage value. Single Chop site.			$ 42		- 42	- 42
	Planting of 1000 seedlings/acre			-63		- 63	- 63
1	Survival check			- 1		- 1	- 1
2	Prescribed burning			- 3		- 3	- 3
	Brownspot check			- 1		- 1	- 1
24	Pulpwood marking & sales admin.			-2.50		- 1	- 0
25	Pulpwood thin	5			$ 205	$ 77	$ 19
34	Pulpwood marking & sales admin.			-2.50		- 1	- 0
35	Pulpwood thin	7.0			350	89	12
44	Sawtimber marking & sales admin.			- 5		- 1	- 0
45	Sawtimber & pulpwood thin	3.0	1.5		640	110	9
54	Clearcut marking & sales admin.			-7.50		- 1	- 0
55	Clearcut		10		4458	516	24
	Net present value					$ 678	$ - 46

APPENDIX 2

Precautionary Pesticide Use Statement

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of the reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level, isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registration of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or state extension specialist to be sure the intended use is still registered.

FPM Lib

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